

Patent claims

1. Method for operating a fuel cell battery (1), in which an integrity state of the battery is determined by means of measurement of operating parameters and programmed evaluation of the measurement data and the battery is controlled for the purpose of reliable operation in such a manner that the maximum electrical output power is subjected to a limitation which is dependent on the integrity state or an interruption of the operation is initiated, with the integrity state being characterizable by at least two parameters, in particular a parameter pair  $c_j$ ,  $d_j$ , so that from a relationship which contains the parameters an internal electrical resistance ( $R_i$ ) of the battery can be calculated on the one hand and a statement on the quality of the battery can be derived on the other hand.
2. Method in accordance with claim 1, characterized in that the battery comprises a chamber (30) in which reaction gases (51, 52) are burned after passage through the fuel cells; and in that at least one sensor (31) is used in this chamber in order to monitor the presence of a flame, with a measurement signal being produced in the sensor as a result of physical properties of the flame, in particular of a production of heat at the flame temperature or an emission of photons.

3. Method in accordance with claim 1 or claim 2, characterized in that a mathematical relationship (II) exists between the internal resistance ( $R_i$ ) and an amount of fuel ( $Q_F$ ) which is fed into the battery; and in that the parameters  $c_j$ ,  $d_j$  enter into this relationship as proportionality factor or as exponent respectively.
4. Method in accordance with any one of the claims 1 to 3, characterized in that current values of the parameter pair  $c_j$ ,  $d_j$  are determined by means of periodically carried out diagnostic measurements and by carrying out digital computations (IV - X"); and in that as a result of these values the control of the battery is adapted where appropriate; or in that, depending on the integrity state, a message is displayed that a replacement of the fuel cells is required.
5. Method in accordance with claim 4, characterized in that a table of values of the parameter pair  $c_j$ ,  $d_j$  is determined on the basis of a collective of batteries (1) having a broad spectrum of different integrity states (j); and in that these values are used in the control instead of the values which are determined by the diagnostic measurements, with a minimum deviation of the results of the diagnostic measurement being aimed for by means of a predetermined criterion (IX - X").
6. Method in accordance with claim 5, characterized in that a request for the interruption of the operation is indicated by the system control (8) in the event that the minimum deviation in

accordance with the predetermined criterion (IX – X”) does not exist.

7. Method in accordance with any one of the claims 2 to 6, characterized in that the monitoring of the afterburning is carried out by means of a thermo-generator (31).
8. Method in accordance with any one of the claims 2 to 6, characterized in that the monitoring of the afterburning is carried out by means of a UV probe (31) or an ionization measurement.
9. Method in accordance with any one of the claims 2 to 6, characterized in that the monitoring of the afterburning is carried out by means of a CO sensor which is arranged in the exhaust gas flow.
10. Plant with a fuel cell battery (1), in which the method in accordance with any one of the claims 1 to 9 is used, characterized by a control device (8) and an adaptation device (10) for carrying out the method.